Cement MILL SECTION of

Concrete

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Geology of Cement Rock

By U. S. Hannum

There are a number of ways in which some knowledge of geology can be of use to the quarry man—especially to one about to open a quarry of some size, and the writer will attempt to point out some of them. Some old stories, if good enough, will bear re-telling and surely there is no story so wonderful as the story of the formation of the earth's crust, big as the world and varied as the different localities, so we will venture to re-tell, briefly, a small part of it.

Limestone is almost entirely a marine deposit although it is sometimes deposited in fresh water and it is nearly always of an organic nature being composed principally of shells and coral cemented together by lime carbonate, and compacted into a solid mass, being deposited during the periods of deeper water. The organic nature of limestone is sometimes apparent in the visible fossils, sometimes they can be seen only with a microscope, and sometimes the shells have been pulverized by the grinding action of the waves until all trace of their form is lost.

Sand, sandstone and shales are usually shallow water products, the water being then too shallow to support great quantities of animal life. Shallow water is usually in close proximity to the shore so that great quantities of suspended matter were deposited forming the sand and shale beds. The deposit of sand was also affected by the proximity of streams which poured their waters, laden with the debris of a continent, into the ancient sea. Therefore if a desirable shale contains too much or too little sand it should be prospected at other points in the neighborhood as the sand content sometimes varies a great deal in comparatively short distances. The upper and lower parts of a shale bed are usually most free from sand, the shore line at the time of formation not being so close as when the middle of the shale bed was formed. The finely divided mud which formed the shale bed is carried farther from shore than the sand.

Sandstone very frequently lies tilted upon the underlying beds and upon other portions of itself, showing very clearly the effects of currents of water upon the deposit, but shale and limestone forming material was laid down in quieter water and practically level—the gentle washing of the deeper currents having a tendency to fill any depressions in the ocean floor and to maintain it at a level, but it is seldom we find the rock-beds lying level. This brings us to a set of conditions which greatly affects quarrying operations.

The earth's surface, from causes not fully understood but likely the shrinkage of the earth as it cooled, has wrinkled in a manner which has often been compared to the skin of a withered apple, the wrinkles varying from the mountain ranges down to elevations of only a few feet and the flanks of the larger uplifts being wrinkled and cross-wrinkled and faulted in every possible way and at distances, usually, from a few thousand feet to a few miles. This wrinkling is the probable cause of the vertical joints which exist in all hard rocks and are often seen in the shales, the major joints which are called "strike joints" running parallel to the principal uplift of the region which may be a mountain range several hundred miles away. These are crossed by another system of joints at an obtuse angle and called "dip joints" although sometimes three sets of vertical joints are seen. A twisting uplift is believed to cause rectangular jointing which is occasionally seen but the joints are little affected by local folding and usually are fairly constant in direction over wide areas.

Jointing is also much affected by the extent to which weathering has taken place, as we shall see later.

The quarry man who wants building stone will likely find it best to open the quarry face parallel with the major joints and in blasting with small drill holes, the rock can be thrown down easiest with the face in that direction, although it will take more secondary blasting to prepare it for loading and crushing. The direction of the secondary joints will determine which end of the quarry face it is advisable to work from, as the rock to be thrown down will lock behind the standing rock if worked from the wrong end. The high part of the earth wrinkles are called "anticlines' and "domes" and are described by oil men as "structure" while the low part of the wrinkles are called "synclines" and for convenience we will use these terms.

The location of the quarry with reference to structure very largely affects the water likely to be encountered in its operation. It should be borne in mind that one-third of the rainfall is supposed to reach the sea by underground channels and that practically no water migrates on structure except to run down the dip toward the synclines or to adjacent beds of streams. The condition is shown by the difficulty of gettng good water wells on anticlines while in decided synclinal conditions almost any hole in the ground will fill with water nearly to the top. Every joint and bedding plane has a tendency to drain the anticlinal quarry while it may be pouring water, possibly from miles away, into the synclinal quarry. The writer knows of two coal mines a few miles apart, one dry and a fine mine to work and the other so wet that it is only by constant pumping with several steam pumps that the shaft can be sunk at all.

In quarrying, the synclinal location should be avoided if possible and should be rejected unless good facilities are at hand for drainage. Where any choice exists the quarry should be opened on structure and so as to work up the dip away from the face. An engineer's level should be used, if necessary, to determine the direction of the dip and this requires a good deal of care as on bluff outcrops the shale weathers away from under the outcrop letting the ledge drop down, thus showing a dip at the outcrop which does not truly represent the attitude of the ledge. Some of the earth movements we have been considering undoubtedly occurred very long ago and during a long period of time while some are very much up to date and desidedly sudden as, for instance, the earthquakes which have occurred on the Pacific coast within the last few months, which are believed to be caused by slippage along a fault-plane.

In the mid-continent region near the edge of the glacial drift it is usual to find large dumps of glacial matter piled against the north and west sides of structures, while very little is on their top or south and east slopes. This would indicate a rather recent movement as the last glacial period, comparatively, was only yesterday. Some movements the writer has traced were in progress during the lower Pennsylvania period, and have left a record showing that they covered a long period of time. Some buildings that man has erected along the Mediterranean have been submerged by the subsidence of the coast or the rising of the sea, but man's written history is too short to be of much help in studying these movements.

It is helpful to the student of geology to get an idea of the immense amount of time involved in the formation of the earth's crust after the deposit of sedimentary rock had begun. When one considers that in the mid-continent region, near the edge of the glacial drift, the ocean bottom was elevated and depressed many times, causing the alternate beds of rock and shale, that at times the water receded leaving them exposed for long periods of time, only to be again submerged, that the waters receded for the last time, that erosion commenced and that several hundred feet of the upper beds were carried away, that with the surface apparently about as at present, the glacial drift (variously estimated at from 20,000 to 125,000 years ago) occurred covering the surface with (at the edge) only a thin layer of glacial sand and rock, and that only a part of the glacial matter has been carried away since that time, one can begin to comprehend the immense amount of time involved and the great changes which have occurred, and this will help make understandable conditions for which no explanation could otherwise be found.

Now, earth movements happening during the formation of beds are very apt to affect their thickness. An upward movement during a shale forming period thinning the bed, for the silt gravitates and washes into the depressions, and an upward movement during the limestone forming period may thin the limestone bed or stop the deposit of limestone altogether, causing a shale to take its place. The depth at which limestone was deposited was apparently not great, as limestone is known to be depositing at the depth of 20 fathoms (120 ft.) at the present time. The effect of a downward movement occurring during their deposit is in general to thicken all beds, as the tendency was for the ocean floor to remain level, and it sometimes has the effect of maintaining the deposit of limestone unbroken while on structure a shale would be forming, thus making a very thick bed of limestone.

Beds are very often unable to accommodate themselves by bending to the forces to which they are subjected and instead of bending are fractured, usually with some vertical displacement of the beds, and these fractures are called "faults." If no vertical displacement occurs it is called a fissure, but the former result is much the more frequent.

Faults are called thrust faults when one side of the fracture has pushed forward on top of the other, and normal or gravity faults when the break has occurred with vertical displacement and little or no horizontal movement, this type being much the most frequent.

Faulting may result in nothing more than a slight tilting or shaken up condition of the ledge, or it may bring an altogether different bed of rock or shale up level with the bed it is desired to follow, and this condition may extend from a few yards to hundreds of miles. The United States Geological Survey illustrates a fault with the upthrown side eroded away, in which an ordinary hammer lies across the fault, resting on beds on the opposite sides, which would normally lie many thousands of feet apart vertically.

All the faults the writer is acquainted with are bad things to encounter in quarrying, and the prospective quarry should be examined carefully to see if the ledge is continuous and if any disturbed condition of the ledge is noted. Steps should be taken to see just what did happen at that place, as faults are not always easily discovered and are much more common than is usually supposed.

The actions of wind, rain, and frost have produced vast changes in the earth's surface and of these we will consider only those caused by water as most nearly affecting the quarryman. The effect of water is two-fold, the mechanical action everyone is familiar with, but its chemical action is probably its greatest agency. Rain water may be fresh, but it is never pure, having absorbed oxygen and carbon-dioxide from the atmosphere which greatly increases its capacity as a solvent, and on filtering through vegetation and absorbing humus acids its solvent properties are increased still more.

It should be borne in mind that limestone, except for its impurities, is entirely soluble, its impurities remaining to form soil, and it may be noted that all soil, with the exception of vegetable mold, came from the disintegration of rocks. Now the action of fresh water on reaching the lime beds is to widen the joints and bedding planes and open the invisible joints which exist in all rocks. This action continues until the rock which in the hill was thick bedded and massive, is later and nearer the surface much more stratified and jointed, and finally lies loose on the hill side, a small rock waiting to be dissolved and to follow its fellows to the sea and take a place in forming a new continent. Who knows?

The action of water after becoming heavily charged with chemicals in solution is opposite to that of fresh water, and tends to deposit the matter in solution at any point where any evaporation can occur or where any reactions take place, and this gives the water cementing and building-up properties. This effect may be seen in the vicinity of limestone springs, where rock ledges are frequently very much thicker and less jointed than elsewhere.

It is not infrequent in cement quarries to find a decided difference in the composition of rock at points a few hundred feet apart where the exposure has been different, and as it is unthinkable that there should be a difference in sea water at points so close together, it is to subsequent weathering that we must look for a cause. For the same reason there should be a decided difference in the composition of synclinal rocks as compared with those on structure. For although fresh water falls in synclines after they are exposed, the time since their exposure is a small part of their history, and while buried nothing but strongly charged water—and a great deal of that—reached them. Little water of any kind penetrates deeply into the crest of the anticline. This is apparent to anyone familiar with drilling operations. Lime carbonate, being easily soluble, will likely be found in highest percentage on anticlines, as it will be where the roof has been best that the rock will retain to the greatest extent its original character.

The question of chemical composition as relating to structure has never been fully investigated, as far as the writer knows, but he has seen considerable differences in composition apparently caused by only slight difference in exposure and the composition of the ledge, where that is important, should be carefully tested.

Many times this space might be used in telling all the available knowledge concerning the topics we have considered so briefly, much more than that yet remains for man to find an explanation for, but that this peep into Nature's workshop will help the reader to answer for himself some of the questions which arise concerning his own locality is the hope of the writer.

Withdrawing Fine Material From Bins

In the designing and building of deep storage bins for storing cement and pulverized rock one of the important points and one which appears to be hard to solve is providing a positive method for withdrawing the finely ground material. A quite common practice involves the use of steel chutes with slides and screw conveyors but this method does not always overcome the tendency for the material to arch and hang up in the bin, and then when it does let go, to flow almost like a fluid, flooding the conveyor and sometimes the tunnel.

The following descriptions are of interest as showing the latest practical methods:

By E. J. Strock

Superintendent Colorado Portland Cement Co.

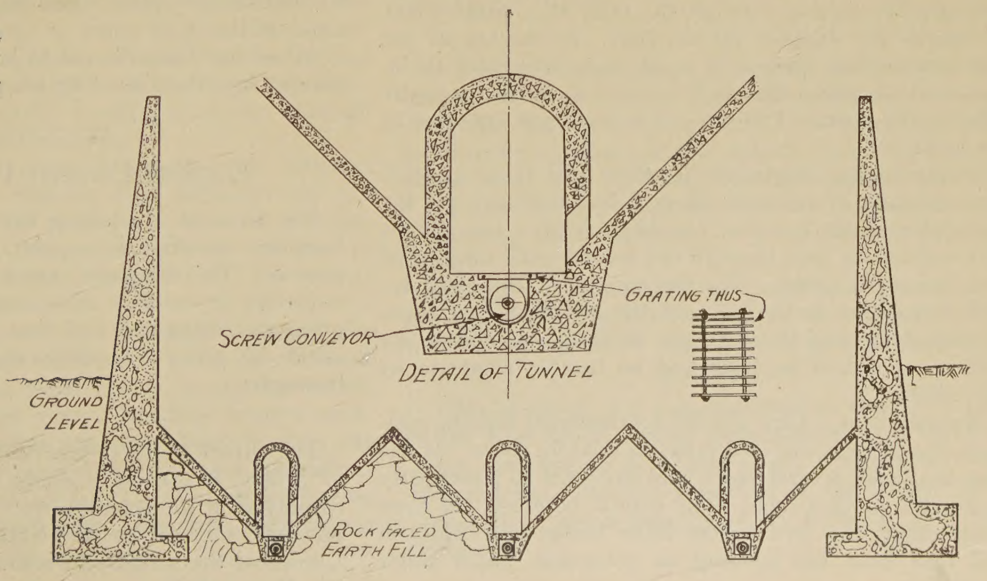
The subject of withdrawing finely pulverized material such as cement from bins has bothered a good many cement men. While the writer was with the California Portland Cement Co. at Colton, Cal., we built cement bins which, in my opinion, eliminated all the troubles of bins with which I am familiar. The accompanying sketch gives the main points. This is not a designed bin, but merely a sketch showing the idea to be followed.

First note the side walls and the bottom form a triple hopper; feeding to three funnels. On the second set of bins built, the tunnels were not made round on top, but the top sloped up with a narrow walkway on the top. By this means less cement lodged on top of the tunnel.

The sketch inside the walls shows, in larger detail, the opening in the side of the tunnel, allowing the cement to flow to the floor of the tunnel, and thence into the conveyor in the floor. One item not shown in the sketch is that the shoulder which carries the weight of the grating over the screw (upper sketch) was made deeper than shown, and 2-in. plank covers were put over the grating. When no cement was being fed at a given point, both the grating and plank were over the conveyor. While cement was being run into the conveyor, the planks for a short distance were removed; when through drawing at that point, covers were replaced, thus keeping down dust. *The gratings were never removed while the screw was turning.*

Plank covers were placed in the tunnel over the openings in the tunnel walls, these planks sliding up and down over the openings, with the ends of the planks running in channel irons. The holes were large enough for a man to crawl through. The ends of the tunnels were sealed, having doors that were kept closed, and a fan situated in another room drew out the dust which rose in the tunnels.

Not a single angle was found inside the bin anywhere that was not an open angle, flaring toward the cement. Even the pilasters met the main wall in this manner, and



Sketch Showing Arrangement of Bin That Gave Good Results.

there was no place to help the cement to arch over. Up to the time the writer left the California plant, these bins worked splendidly.

The details of these bins were worked out by C. A. Hutchinson, the designing engineer for the California Portland Cement Co.

For fine material I think these bins cannot be improved upon. One can see that there is almost no chance for material to hang up in bins of this form, and a second, larger, bin was built after trying out the first. The second one was of about 100,000 bbls. capacity.

By P. R. Chamberlain

Superintendent Dewey Portland Cement Co.

For the purpose of drawing cement from the storage bins without flooding, we use a 9-in. double flight screw conveyor, 9 ft. 6 in. long in a 10-in. pipe, as a feeder to the main conveyor. We find this overcomes flooding on cement, but is not quite so satisfactory on raw material, although we experience little difficulty from this source.

On raw material we use compressed air to stir the material directly over and around the opening into the feeder. Air cannot be used for this purpose on cement, unless some means is provided for removing the moisture. However, we experience little difficulty with the cement arching. We have used this type of feeder for a number of years on cement, and have found it so successful that when remodeling our raw material storage we installed duplicate feeders in that department.

By John J. Porter

Vice-President and General Manager
Security Cement & Lime Co.

We have in use some large silo tanks for the storage of ground raw mix, which are provided with cone bottoms and were originally equipped with spouts and slides at the bottom of the cones. This arrangement gave a great deal of trouble, due to arching and flooding of the material, and necessitated the use of compressed air and the constant attendance of an operator to keep the flow of material anything like constant.

Recently E. S. Guth, our superintendent, worked out another arrangement for taking the material from these tanks, mhich operates perfectly and needs no attention. This arrangement consists of a 10-in. pipe passing horizontally entirely through the tank at a point about two-thirds the distance up the cone. In the top of the pipe are cut two slots, each about 6 in. wide and 18 in. long, and so spaced that they come close to the opposite sides of the tank. A 10-in. screw conveyor operates in the tank.

Owing to the length of the slots and their location near the sides of the tank, there is less tendency for the material to arch, but if it should arch over one slot, it will continue to feed through the second until finally the arch is broken down. The dimensions of the slots are such in relation to the sides of the conveyor that there is little danger of the conveyor choking up, and in six months' operation we have had no trouble whatever of this nature.

We also have a very similar arrangement feeding pulverized coal from our coal tanks in the kiln room. It has been in use for several years, and has given us practically no trouble in that time. The results obtained are very satisfactory, the feed to the kilns being quite uniform and free from the flooding so noticeable under other conditions.

The Chemist's View of Bin Design

By H. Larmour

Some chemists believe that the Devil, in his machinations, has cleverly put two things over—the pound calorie and the engineers who designed the bins we find throughout the cement industry. Exceptions are occasionally showing in some of the latest designed mills.

The dictionary defines "bin" as a manger, crib, hutch or trough, and a casual trip through most cement mills leads one to believe that the engineers referred to the dictionary. Four walls and any kind of bottom seems to have satisfied the designer.

The chemist defines a bin as one so constructed that the material does not slide on itself, but moves downward as a unit mass. This can best be accomplished by constructing the entire bottom area at an angle sharper than the angle of flow.

This means that flat bottom, half round, round and hopper bottoms of 45° slope, for ball and tube reduced materials in the cement mill, are in disfavor.

The ideal bin that satisfies the chemist is one of any size, shape or height whose full bottom area is a sharp angled discharge, so that *all* the material will flow from the bin.

There is continual warfare between the laboratory and mill operators as to the limits of discharging any of these bins with faulty designed bottoms.

When any of the bins with faulty bottoms are allowed to become more than half empty, the material remaining falls with a rush and becomes enlivened with air, causing the material to *flush* through the feeder into the mill or kiln.

The effects are apparent.

The raw tube mill and kiln bins of faulty designed bottoms give a still further cause for complaint.

It often happens that a shortage of raw material is experienced, and it is necessary to clean these bins to supply a sufficient feed. When the bins are so constructed that the slope of the bin bottom is less than the sliding angle of the material, dead material will be deposited in the bin. This dead material zone will be mostly composed of clay. The mix will be low, with attendant building of hard rings in the kiln. After these bins have been emptied and are again being filled, the mix is high, due to segregation of materials. This continues until equilibrium has been established in the bin and the live mass again begins to move over the material in the dead zone.

All of the blame is not to be laid to the engineer; the chemist has also failed by his passive attitude.

English Cement Prices Reduced

The Cement Marketing Co., Ltd., 8 Lloyd's avenue, London, recently announced a reduction in prices in cement. The company stated that in anticipation of a reduction in railway rates and wages, the reduction in price was intimated and that full and prompt supplies could be given for deliveries by railroad or water transport.

Dr. Oliver Bowles, mineral technologist of the Bureau of Mines, is making a study of methods of production employed in the lime quarries of Virginia. Dr. Bowles recently outlined to the National Lime Association in Cleveland the proposed work of the Bureau of Mines for the lime industry.

Effect of Shortage of Coal and Cars

Both the coal shortage and car shortage are becoming serious problems in the cement industry, and with few exceptions the coal question has proved the more serious of the two, particularly where coal is used for firing the kilns and dryers.

In the Lehigh Valley District the railroads are furnishing box cars for cement shipments, but doubt is expressed as to whether the car supply can be kept up in view of the shopmen's strike. It is believed that time alone will tell this.

As to coal supply, early in the month of August some of the mills had enough coal on hand to allow operation for at least five weeks, with shipments on the way sufficient for another month, provided all the cars on the way reached their proper destination. Movements of the coal were reported very slow. Other companies were not so well supplied, and faced possible shutdowns on account of lack of coal. In one instance enough coal has been secured to keep the plant running, but it was necessary to pay fancy prices for part of the tonnage.

An official of one of the large cement companies cited that a hasty survey made early in August in connection with the question of priority of coal shipments indicated that with the exception of one or two companies the coal received at plants east of the Mississippi was sufficient to last on the average of not over ten days. Railroad officials advised that no difficulty about cars need be expected in the immediate future.

In another instance, where the company has mills in the East and South, the coal controversy was considered as presenting a much more serious problem. It was stated that apparently it is impossible to get effective protection for the great number of men who are willing to work, and with the rapidly approaching winter season, great suffering will result from the shut-down of the mines at this time. It is cited that a very limited supply of coal is carried in stock, and the cement industry, which is a large consumer of fuel, had only sufficient supply to keep the plants in operation for approximately two weeks, and therefore unless the mines were started up immediately the entire cement industry faced a complete collapse.

A number of the plants in Michigan are closed down because of lack of fuel, and while the car shortage would be a serious matter, it has little effect at the present time, as stocks of cement are becoming exhausted to the point where there is little to ship. Little hope is expressed that the cement plants will get supplies of coal as long as the present priorities are in effect. It is believed that the same relative conditions obtain through the country east of the Mississippi.

Direct reports from various companies not included in the above localities indicate that although the car shortage has not been felt as yet, a severe car shortage is anticipated this fall. Where there is no difficulty in procuring cars for shipments, the quality of the cars is not as high as it should be.

In the Kansas district a car shortage is looked for which will be due to two causes this year: the railroad shopmen's strike and the usual cause—heavy movements of crops at this time of year. Another western company reports that its plant was shut down in July for lack of fuel, and would be unable to resume operations until the coal strike was settled, the coal strike having utterly ruined a year which might otherwise have been a fairly profitable one for the company.

Texas plants, where fuel oil is used largely in place of coal, are experiencing no difficulty out of the ordinary, as the railroads are taking care of shipments as well as in former years. Ample supplies of fuel oil are to be had at a fair price. Although the car supply is now excellent, trouble is anticipated if the railroad strike continues indefinitely, as inability to ship would necessitate closing down operations. Satisfactory car supplies are also reported from California.

The car situation in the state of Washington is outlined in the *Cementer,* issued by the Superior Portland Cement Co., from which the following is abstracted:

> Railroad officials tell us that we must prepare for the worst car shortage ever experienced. The reason for this is because for eight years railroads have not bought enough new cars to offset the natural loss from wear and wrecks.
>
> The percentage of bad order cars is now 16%, instead of the normal 6%. Surplus of cars is rapidly decreasing, and the few cars that are over are mostly bad order. Although the railroads have bought a lot of new equipment, a very small portion of this represents box cars, and they cannot be delivered in time to help out this summer.
>
> As soon as the car shortage reaches us it will be impossible for us to load anything but full capacity. In other words, no small cars can be shipped.

The Situation in Canada

Conditions in Canada are summed up in the following letter from F. P. Jones, general manager of the Canada Cement Co., Ltd.:

"Up to the present time this company has received a good supply of cars our great trouble has been in obtaining a sufficient supply of coal to operate our mills even to the 40% capacity we have been operating them at, and in addition to this, the high price of the coal obtained has prevented us from reducing the price of cement as we should have liked to have done.

"If the present coal shortage keeps up, it may be that the railways may not be able to obtain sufficient coal to handle all the freight offered, and they undoubtedly will give preference to the grain when it starts to move; this will prevent them from giving sufficient car supply to the cement companies to move the cement and other commodities.

"The writer can see no possible chance of any cheap coal or any further reduction in the freight rates this year, and we therefore feel that in advising our customers to stock up, we are advising them to do what we would do if we were in their places."

The British Columbia Cement Co., Ltd., whose plant is located on Vancouver Island, B. C., is not affected by car shortage, due to railroad troubles in the United States. Plenty of coal to operate the mill is produced nearby the plant.

Eight thousand bags of cement loaded at Antwerp arrived at dock in San Francisco aboard the Swedish freighter Balboa on August 14, consigned to building contractors in Santa Clara county, according to an announcement made by Paul Scharrenberg, secretary of the California State Federation of Labor. The cement was bought by the unions and is to be transported to San Jose.

Makers of cement, it was reported, refused to sell their product to union contractors there unless a certain number of non-union men were employed on the jobs.

Charles Scott, Jr., vice-chairman in charge of finance of the Red Cross central committee, died at Gloucester, Mass., on August 21. Mr. Scott, whose home was in Philadelphia, was vice-president of the Giant Portland Cement Co., and a director of the Railway Steel Spring Company.

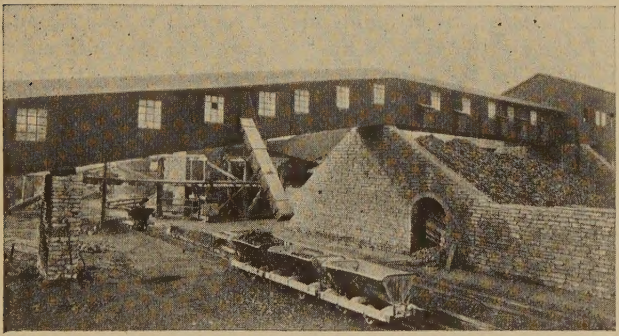
Steel Belt Conveyor for Cement Plants

The Sandvik steel belt conveyor which has recently been introduced in this country by the Swedish manufacturer, has been in use in European countries for about twelve years and is particularly adapted to use in cement plants handling raw materials such as clay, limestone and coal, as well as cement clinker and cement.

This new belt in America is made of a flexible steel, which is cold rolled, hardened and tempered by a special process. Steel belts have advantages, it is claimed over apron conveyors, and wire woven belts, through the elimination of heavy maintenance costs, power consumption and the spilling of materials through joints and interstices. For conveying warm, sticky, sharp, or abrasive material the steel belt is peculiarly adapted.

When installed as a conveyor with standard size pulleys, the belt is subjected to a working stress of 28,000 to 30,000 lbs. per sq. in. when traveling over the pulleys. Comparing the steel belt with flat rubber belts of the same width, it is claimed that the steel belt possesses greater transverse rigidity and a higher capacity, as the edges, even with a one-sided load, do not yield in a downward direction. This allows a relatively broader part of the belt to be used for carrying the load. This is necessarily so because the steel belt is less flexible than a textile fabric.

A roller supported type is used for conveying heavy and hard materials. The surface of the belt acquires such a polish in a short time that the friction and power consumption is claimed to be almost negligible and in turn a long working life is given the belt.



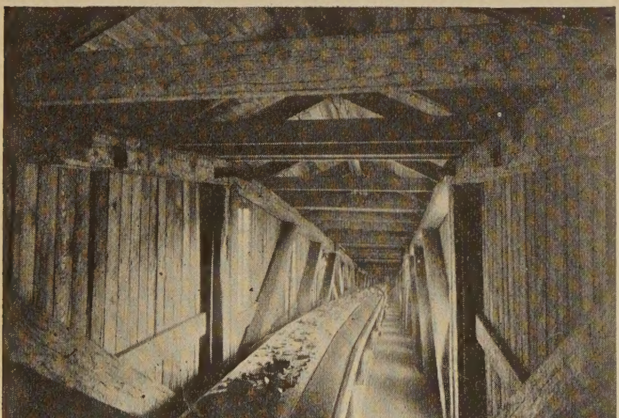
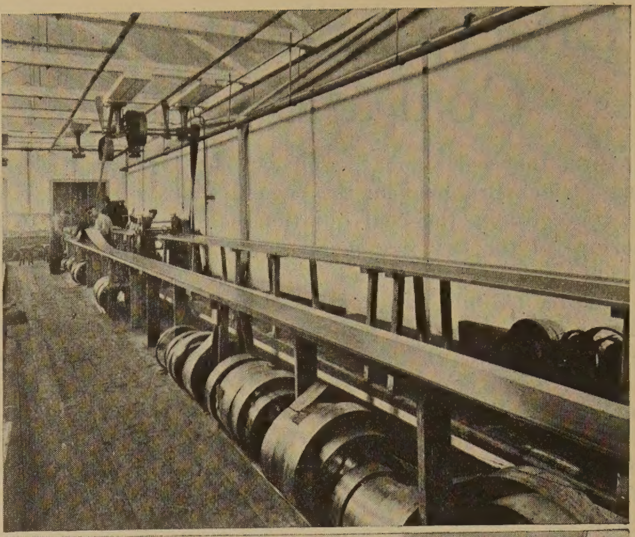


Fig. 1—A Steel Conveyor Belt Is Used in This Swedish Cement Plant

Fig. 2—Conveyor Handling Limestone in a Swedish Cement Plant



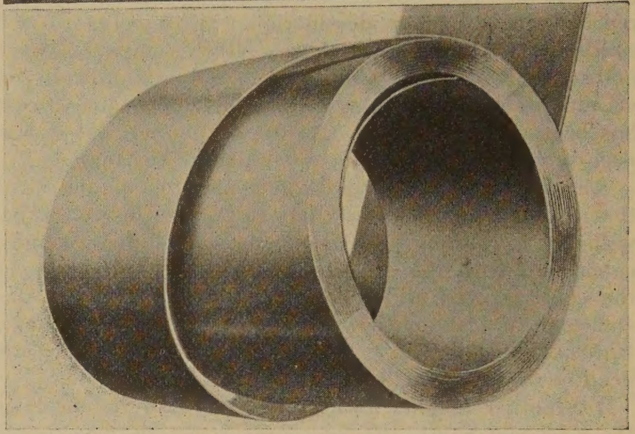


Fig. 3—The Inspection Room—If the Linear Deviation Exceeds 0.03% the Belt Is Straightened by Rolling

Fig. 4—The Steel Belt as Rolled for Shipment

In arrangement and working they resemble ordinary textile or rubber belt conveyors, departure in design being aimed toward simplicity, reducing the initial cost and upkeep.

The conveyor bands are made of high grade Swedish charcoal steel, with a percentage of carbon of about 0.65, in one piece lengths of 200 to 330 ft., in various widths, and in thickness from 19 to 21 S. W. G. They have, therefore, the elastic wear resisting properties so essential in a conveyor band. By the special method of heat treatment, hardening and tempering, the Sandvik belt acquires better rust resisting qualities than common cold rolled steel of similar composition.

Steel belt conveyors may be arranged to run on idler supports or to slide on wood runners.

In connection with heavy, hard and abrasive materials, the roller type is preferable, the material being placed centrally on the belt and the edges left free, as is the case in general practice with flat belt conveyors.

The nature of the steel belt permits, for certain classes of material, the conveying strand of a conveyor to slide on wood runners instead of being supported by roller idlers. The length of a sliding conveyor depends upon the material conveyed and conditions. A center distance of 100 to 150 ft. is not unusual. The wood runners acquire, in working, a glass-like polish, absorbing only a small amount of extra power for the first few days when the installation is new. Graphite is used as a lubricant.

The capacity of a Sandvik steel belt depends upon the material handled and its size, speed of conveyor, incline, method of loading employed, etc.

Coal or similar lumpy material..........	0.11 cu. ft. per running ft.
Coarse crushed chemicals and similar products	0.15 cu. ft. per running ft.
Raw sugar and similar sticky material...	0.16 cu. ft. per running ft.

The end pulleys are of cast iron and 40 in. in diameter. This dimension is standard and the result of many years of experience in installing steel belt conveyors. For conveying hot material, a 48-in. pulley is recommended. The face of the pulley should be narrower than the width of the belt—12 in. face pulley for 16-in. belt.

The drive of the steel band generally consists of spur gears. The driving gear can be placed either at the charging or discharging end.

Material may be discharged in the usual way over the end pulley or at any desired point on the belt by means of laminated spring steel ploughs, taking off a portion, or all, of the load. Traveling ploughs may be arranged to discharge along the entire length of the conveyor. Discharge may be effected at several points at the same time.

The steel belts are guided by the proper alignment of the end pulleys and supporting rollers. The bearings of the roller idler shaft are adjustable longitudinally. On long conveyors flanged idlers are used at certain intervals instead of ordinary ones, but do not guide the belt as in the case of rubber belts. They are, however, used as an alarm or danger indicator if the belt should happen to run out of line slightly, thus necessitating some adjustment.

The joint is an ordinary, single row, riveted lap joint. The overlap is made short in order to prevent material from wedging into the joint and ripping it open, especially when "sliding" belts are used.

For the above details CONCRETE is indebted to Sandvik Steel, Inc.

Portland Cement Output in July

The statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers or portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from two producers.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN JULY, 1922, AND PRECEDING MONTHS

	Production (bbls.)		Shipments (bbls.)		Stocks at end of month (bbls.)	
	1921	1922	1921	1922	1921	1922
Jan.	4,098,000	a4,291,000	2,539,000	a2,931,000	10,300,000	a13,316,000
Feb.	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	a14,142,000
Mar.	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	a13,848,000
1st quar.	15,240,000	15,254,000	12,091,000	13,218,000	....	....
Apr.	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	a14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	a12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	a10,718,000
2nd quar.	27,228,000	31,664,000	27,984,000	34,811,000	....	....
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	8,424,000
Aug.	10,244,000	....	12,340,000	....	8,280,000	....
Sept.	10,027,000	....	11,329,000	....	6,953,000	....
3rd quar.	29,839,000	....	33,970,000	....	....	....
Oct.	10,506,000	....	12,114,000	....	5,348,000	....
Nov.	8,921,000	....	5,195,000	....	9,091,000	....
Dec.	6,559,000	....	3,697,000	....	11,938,000	....
4th quar.	25,986,000	....	21,006,000	....	....	....
	98,293,000	....	95,051,000	....	....	....

a Revised.

Stocks of clinker or unground cement at the mills at the end of July amounted to about 4,861,000 barrels compared with 5,851,000 barrels at the beginning of the month.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in June amounted to 14,179 barrels, valued at $30,400. The total imports in 1921 amounted to 122,317 barrels, valued at $388,828. The imports in June were, from Denmark, 8,502 barrels; Canada, 5,668 barrels; other countries, 9 barrels. The imports were received in Porto Rico, 14,139 barrels; Vermont, 21 barrels; Maine and New Hampshire, 10 barrels; New York, 6 barrels; and San Francisco, 3 barrels.

The exports of hydraulic cement in June were 96,263 barrels, valued at $283,011; of this total 94,015 barrels, valued at $268,504, was portland cement, which was sent to Cuba, 42,228 barrels; to the other West Indies, 3,041 barrels; to South America, 25,008 barrels; to Canada, 8,115 barrels; Mexico, 7,684 barrels; to Central America, 6,227 barrels; and to other countries, 1,712 barrels. The total exports of hydraulic cement in 1921 were 1,181,014 barrels, valued at $4,276,986.

The statistics of imports and exports of hydraulic cement in July are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT IN JUNE, 1922, AND PRECEDING MONTHS (a)

Month	Imports (bbls.)		Exports (bbls.)	
	1921	1922	1921	1922
January	14,678	17,036	225,561	70,725
February	18,269	5,157	84,230	82,421
March	7,631	1,597	97,302	103,556
April	1,540	10,855	93,009	75,412
May	2,035	2,521	82,409	100,068
June	1,657	14,179	100,831	96,263
July	3,455	(b)	81,091	(b)
August	10,988	.....	84,538	.....
September	5,177	.....	84,668	.....
October	11,448	.....	79,871	.....
November	20,112	.....	71,214	.....
December	25,327	.....	96,290	.....
	122,317	.....	1,181,014	.....

a Compiled from records of the Bureau of Foreign and Domestic Commerce.

b Imports and exports in July, 1922, are not available.

Conditions in German Industries

Shipyards report a decline in repair orders, due to the rise in production costs. The locomotive and freight car industry is dull on account of the lack of new orders. The machinery industry has secured few orders, and reports that the countries of high exchange are well stocked and able to compete in these commodities; this results in the quotation of lower export prices. Electrotechnical plants are actively employed with old orders, but complain of the tightness of money.

The cement industry is active, supplying the inland demand of the building trades. Cement is selling for 289 marks per 100 kilos in Berlin. The wood working and lumber industries are somewhat depressed, with export prices a little in excess of those in neighboring countries. The hardware and cutlery industries are active, with many foreign orders as a consequence of the fall in exchange; while the rubber industry reports export sales as decreasing. Conditions are satisfactory in the paper industry, and activity is noted in all leather goods, especially shoes. The actual production cost of better grade shoes is stated to be 1,100 to 1,300 marks a pair.—*Commerce Reports.*

The Glens Falls Portland Cement Co. of Glens Falls, N. Y., has increased its capital from $600,000 to $1,200,000, according to a recent report from Albany, N. Y.

Cement Industry in China[1]

By J. Morgan Clements

American Trade Commissioner

INTRODUCTION

For centuries the major part of the structures in China (private homes as well as public buildings, bridges, etc.) have been constructed of brick and stone, as timber is scarce in China and, as a general rule, more expensive and less durable than the other materials. Ordinary lime mortar (lime and sand with water) has been in general use for binding these materials. For making pavements and floors in buildings the Chinese have long used a mixture of lime, clay, and sand, known by the name of "san hwa to," which, translated, means three kinds of earth, to which is added a little water. The damp material is thoroughly tamped into place. The proportions generally used are 1 part of lime to 4 parts of sandy clay. This binds very well, is quite durable under foot traffic, and serves its purposes excellently.

Within recent years modern portland cement, or "red-haired man's mud" (hung mo nai cheong), "foreign mud" (yang li), or "water mud" (shui li), as it is known in different sections of China, is available in large quantities and is being quite generally used in the treaty-port cities of China (those opened to foreigners for residence and trade), in the building projects of Chinese as well as foreigners. It is also being used by railroads in their bridge work and is being distributed more and more for use by the natives in the interior cities.

At the present time the amount of cement produced in China is not sufficient to supply the demand, and importations are being made from Japan and from French Indo-China. Consideration has even been given to the question of bringing in cement from a recently constructed plant of the Ho-Hung Cement Co., at Singapore, whereas formerly considerable cement was exported to the Dutch East Indies and the Straits Settlements, which were insufficiently supplied by the British cement plant at Kuala Lampur (Federated Malay States) and the Dutch plant at Padang, in Sumatra.

With the development of China along occidental lines, there is an increased construction of the western type of residences, large office buildings, and hotels in the cities where foreigners reside. Many new industrial plants also have been constructed and others of modern type have been projected. There has been a very remarkable increase within the last few years in the desire to modernize Chinese cities by tearing down the walls of buildings and constructing wide, modern streets on the sites, built so that they will bear the automobile traffic. Cement is used to a considerable extent in this work. Port development projects are already under way, and new ones are projected. New railroad construction is now going on, and, with the impetus already given to industrial development in China, within a few years other new railway lines and industrial plants of various kinds will be under construction. This means an increasing demand for cement, and even today the Chinese supply is much below the normal demand.

It would seem that there is a remunerative field in China for one or more large modern cement plants in addition to those already in operation. The first desideratum for such a plant (a cheap supply of suitable coal) is, however, not available at present. There is an abundance of coal in China, but the deposits have not yet been extensively developed. The yearly output of Chinese coal at present is about 20,000,000 tons, of which 5,000,000 to 10,000,000 are produced by primitive native methods. This does not supply the present demand for household and industrial use, and consequently the price is high, ranging from $7 to $24 (Mexican) per ton, and the demand is steadily increasing. Under normal conditions such prices are prohibitive for cement making, and the existing plants can only operate profitably on account of the prevailing high price of cement—$6.30 to $7.40 (Mexican) per bbl. in Shanghai.

In considering the erection of a cement plant in China, the first step should be an investigation of the supply of raw materials. Available areas of suitable coal can be found, but a modern mine would have to be developed. This coal mine would have a market for its output in the demand from the cement plant associated with the mine and the normal open-market demand. Limestone and clay strategically situated with reference to the fuel supply could be located, and a cement plant could be erected in a position where it should prove successful.

PORTLAND CEMENT PLANTS IN CHINA

At the present time there are six portland cement plants operating in China. These are located at Tongshan, Province of Chihli; Tayeh, Province of Hupeh; Tsankan, near Tsingtao, Province of Shantung; Canton, Province of Kwangtung; Kowloon, Hong Kong Leased Territory; Green Island, at Macao. The Tongshan and Tayeh plants are operated by the same company, and the Kowloon and Green Island plants also belong to one company.

In the following short description of the portland cement plants operating in China, they will be taken up in geographical order, starting at the extreme north of China, at the Tongshan plant in the Province of Chihli, and going south.

TONGSHAN CEMENT WORKS

This plant is situated at Tongshan, Province of Chihli, on the Peking-Mukden railway, 74 miles northeast of the important port of Tientsin. The works are owned by the Chee Hsin Cement Co. (Ltd.), whose head office is in Tientsin. The cement is known in the market among foreigners as Tongshan cement, and also as Chee Hsin cement.

The Tongshan cement works are the most advantageously situated of any plant in China with respect to outlet to market and raw material supplies. The works are 91 miles by rail from the port of Chinwangtao, on the northeast, and 74 miles from the port of Tientsin, on the southwest. With these relatively short railway hauls, the cement can reach two ports for distribution by sea to Chinese and other ports. By rail it can be distributed to all interior points in North China.

The Tongshan works were originally started by the Kailan Mining Administration, whose nearest colliery is about one mile from the cement plant. The cement plant was sold to the present company and doubtless very advantageous arrangements were made for purchasing its needed fuel from the coal company, which originally owned it.

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[1] From Trade Information Bulletin No. 7, Department of Commerce, Bureau of Foreign and Domestic Commerce.

The cement plant is situated on the limestone at the edge of the coal basin. As raw materials it uses this limestone and also residual clay from the limestone, some nearby alluvial clay, and slack coal from mines of the Kailan Mining Association. All of these are assembled at the plant at very low cost. A small amount of gypsum is used, which is now brought from south-central China, but some from Belgium has been used in past years.

The cement and power machinery is housed in well-built brick buildings, and the layout is well planned. It is composed of two practically individual plants, each plant consisting of two units. One plant (the older) with machinery driven by steam, consists of two 100-ft. rotary kilns, making cement by the dry process.

The new plant, with all machinery electrically driven and all units duplicated, uses the Danish wet process, the clinkers being burned in two 150-ft. rotary kilns. The limestone is crushed in jaw crushers to a maximum size of 2 in. This product is then mixed with clay (to which water has already been added) and ground in short ball mills, using steel balls. Thence it passes for final grinding to tube mills, using Danish flint pebbles in the upper section and steel balls in the lower section, and then into the slurry tanks, where samples are taken. From these it passes into the mixing vats and on to the rotary kilns. In the new wet mills the clinker is cooled by a current of air. The heated air is led off and some of it used to dry the coal, while part of the pre-heated air is used in the kilns. The clinker is carried by elevators to the grinding floor, and, after grinding, by traveling belts to the storage bins.

Cement is shipped in barrels of 375 lbs. net weight. This plant when working at full capacity can produce nearly 3,000 bbls. a day. The company is planning the erection of an additional wet plant with two 220-ft. kilns. Figures giving the cost were not obtainable. The price of this cement in the open market is about $6 (Mexican) in Tientsin, and when contracted for in amounts of 5,000 bbls. could be obtained in Shanghai in June, 1921, ex warehouse, for $7.40 (Mexican).

The Chee Hsin Co. also has a small brick plant near the cement works, and a tile and pottery plant, which makes sewer pipe, tile, cuspidors, toilet sets, and other heavy stoneware.

TAYEH CEMENT WORKS

The works are situated at Shi Hui Yao (a village in Hupeh Province), at the point where the short railway from Tayeh reaches the south bank of the Yangtze River, and is generally known by the name of the more important town of Tayeh. The plant was erected in 1910 and it fitted with German machinery supplied by the former German firm of Arnhold, Karberg & Co. This plant was built for a Chinese company and was operated for four years at a loss of 850,000 taels, having been obtained for operating expenses during these years from Japanese sources on mortgages. No further loans being obtainable, the plant was closed down and foreclosure proceedings were started by the Japanese. However, the Chinese succeeded in completing financial arrangements with the Chee Hsin Cement Co. (Ltd.) of Tientsin, whose plant has already been described, with the result that the obligations were paid off and the old company became affiliated with the Chee Hsin Co., under the name of the Hwa Chi Hupeh Cement Works Co. The reorganized company is capitalized at 1,000,000 taels.

Suitable limestone and clay are said to be abundant in the vicinity of the plant. The coal used is brought a distance of 1,255 miles from the Kailan Mining Administration mines in the Province of Chihli, being transported 91 miles by rail from the mines to the port of Chinwangtao, then by the coal company's steamers to Shanghai (an ocean voyage of 665 miles), and then 500 miles up the Yangtze River to the company's wharf on the river bank. Cement doubtless provides at least a part of the return cargo to down-river ports as far as Shanghai.

The works are very well equipped and the technical management appears to be good. The daily production averages 1,200 bbls. of 375 lbs. net, which are conveyed by aerial trolley to the company's wharf. The cement sells in Hanlow, ex warehouse, for $8 (Mexican) per bbl. During 1919 the company earned a net profit of $700,000 (Mexican).

SHANTUNG CEMENT WORKS

This is a Japanese owned and operated plant, and is located at Tsankan, near the port of Tsingtao, in the Province of Shantung. It was established in 1917 by a Japanese company (the Santo Kogyo Kaisha), with a capital of 1,000,000 yen (1 yen equals $0.4985).

This is an old-type vertical kiln cement plant, equipped with machinery made in Japan and largely bought second-hand. The raw materials come from nearby places in Shantung, coal from the Tsuchuan mine being used for fuel. The output is small (about 300 bbls. per day), but an addition is contemplated to bring this up to 700 bbls. The tests of the cement as reported indicate it to be very good. The cement setting time is 2 hours for initial set and 5 hours and 42 minutes for final set, with 26% water and temperature at 19.5° C. in the laboratory. Results after boiling for 1 hour and 3 minutes, and 28 days in water, are stated to be good. Tensile strength is reported to be as follows:

	Pounds
Neat cement, 7 days	805
Neat cement, 28 days	926
Cement and sand (1 to 3), 7 days	364
Cement and sand (1 to 3), 28 days	434

KWANGTUNG CEMENT WORKS

This plant is located on the south bank of the river, across from and directly opposite the Canton-Kowloon railway station, on the eastern edge of the city of Canton. The plant was built in 1907 by the Imperial Chinese Government. When, under the Republican Government, the southern provinces seceded, Kwangtung Province took over the cement plant and still operates it. The present manager is a Chinese engineer, educated at the University of Michigan. The plant is situated in nice grounds with well-built brick buildings for the plant and offices, and brick residences for the higher employees.

The plant has eight vertical kilns with four stacks. The daily capacity of the kilns is about 550 bbls. of 375 lbs. net. Limestone comes from Fahyuen, 16 miles up the river from the plant, and costs $0.93 Mexican per long ton on the barge at the works. The clay, which is alluvial, is brought from the island of Daitong, four miles down the river from the plant. This costs from $0.80 to $1.00 (Mexican) per long ton at the plant. Some gypsum is used and is brought from central China through Shanghai. Local iron ore (hematite) in small quantities is used to color the cement, as the Chinese prefer a cement of darker color than is usually made. Coal is brought from the Kailan Mining Administration mines in North China, and from Japanese mines on the Island of Formosa. The Kailan lump costs $17.50 (Mexican) per ton and is used for burning the cement in the kilns. Kailan and Formosa slack coal at $12.00 (Mexican) per ton are used for steam purposes.

After preliminary crushing the materials are mixed and ground in ball mills using steel balls, and the subsequent fine grinding is done in the tube mills, using beach pebbles brought from the rocky islands near Hong Kong. The cement is ground to pass 200 mesh, leaving from 12% to 14% oversize on the screen. There is more or less irregular burning in the vertical kilns, so the clinker is hand-sorted before final fine grinding. The finished product is reported to be irregular in quality.

The plant is run on 12-hour shifts, and the men are paid at the following daily rates: 84 mechanics, each $0.90 to $1; 16 foremen (2 foremen to each kiln), each $0.90; 8 firemen, each $0.80; approximately 250 ordinary laborers, each $0.40. This rate is net and the men board themselves, but sleeping quarters are provided free for the higher class of workmen and for some of the ordinary laborers.

The cement of the Kwangtung Cement Works probably costs about $4 (Mexican) per bbl., plus $0.55 for the barrel. These barrels are made at the plant from pine brought down the North River, with bamboo hoops, but are quite serviceable. The cement sells locally at $5.50 (Mexican) per bbl. of 375 lbs.

It is impossible to get accurate figures regarding the cement market with the city of Canton as a distributing center. Reliable information indicates that, on the average, about 1,000 bbls. per day are sold here. Of this amount, 500 bbls. are supplied by the local plant and 1,000 sacks (185 lbs. each) of Green Island cement are shipped in from Hong Kong.

GREEN ISLAND CEMENT WORKS

Two cement works are operated by the Green Island Cement Co. (Ltd.), a British corporation operating under a Hong Kong charter, with its head offices at Hong Kong and managed by Shewan, Tomes & Co. One of these plants is at Kokun, a suburb of Kowloon, just across the bay from Hong Kong. The second is on Green Island (Ihla Verde) at Macao, about 40 miles by water from Hong Kong. This is the original plant, for which the company is named. It was established in 1886.

The Green Island plant at Macao consists of five vertical kilns, with necessary crushing, mixing, and grinding machinery of English make. The clinker is ground to 180 mesh in tube mills using local pebbles. The average production is about 350 bbls. of 375 lbs. net each. Barrels are made at the plant from pine brought from North China, which cost $0.72 (Mexican) each. Limestone is brought down the river from Yintak on the North River in Kwangtung (about 200 miles distant by water), and costs $3.50 (Mex.) per ton at the plant. Clay is dug from the mud flats about one-half mile from the plant, and is dried on extensive drying floors in good weather and in kilns in wet weather. This plant supplies about 900 tons of this clay each week to the allied plant, 40 miles distant at Hokun. The coal used varies according to the price at which the coal can be obtained. When visited by the writer, the plant was using Japanese coal from Ochi, which was then quoted at $24.30 (Mex.) per ton in the open market at Hong Kong. Before the war the price was approximately $9 (Mex.) for the same coal.

Cement from this old-type plant probably costs $5 (Mex.) per bbl., considering the prices for raw materials to be those already stated.

The Hokun plant, at Kowloon, in the Hong Kong territory is situated on the water front at Hokun, and is much larger and more up-to-date than the old plant at Green Island. It has two units—one of old type, consisting of 16 vertical kilns, and one new unit of four rotary kilns each 80 ft. long. Excellent English-made engines, crushers, mills, etc., are in use. Furnaces have mechanical stokers. The materials for cement are automatically weighed and mixed. The clinker is ground to 180 mesh, with about 14% oversize, and the cement is made according to British standard specifications, and guaranteed.

The limestone comes from Yintak, Kwangtung, 230 miles away. During the war, while there were certain disturbances near the quarries, limestone was even brought 500 miles by water from Haifong in Indo-China. Now an effort is being made by outside parties to open a limestone quarry in Kwangtung, just outside of the boundary of the Hong Kong Leased Territory, and supply the Kowloon works with the 100,000 tons of limestone which it uses annually, at a price of $3.10 (Mex.) per ton.

Clay is brought from the affiliated plant at Green Island, Macao, 40 miles away. The coal chiefly used is from Japan, although sometimes coal from North China and anthracite coal from Indo-China are used. These coals sell for approximately $24 (Mex.) per ton in the Hong Kong market, but much better prices can be obtained for large contracts. Bituminous lump is sorted out and used in the kilns and part of the fine coal is ground and used in the rotaries. The rest is mixed with anthracite from Hongay, Indo-China, and used for steam purposes. The daily output of this plant is 2,000 bbls. selling locally at $6.50 to $7.50 (Mex.). The price, when contracted for in large amounts of 5,000 bbls., is now $7.40 (Mex.) in Shanghai, after an ocean haul of 820 miles.

The report of the Green Island Cement Co. (Ltd.) to its shareholders for the year ending December 31, 1919, shows a gross profit of 524,715 haikwan taels, an additional amount of 126,139 taels having been brought forward from profits of the previous year.

CAPACITY OF CEMENT PLANTS

The estimated daily capacity, in barrels of 375 lbs., of the cement plants, which have been described, is as follows:

	Bbls.
Tongshan	3,000
Tayeh	1,200
Shantung	300
Kwantung	500
Macao (Green Island)	350
Hong Kong (Green Island)	2,000
Total	7,350

This gives a total annual production capacity for all plants of 2,682,750 bbls.

PRICES OF PORTLAND CEMENT AND LIME IN CHINA

Cement in China is packed in barrels with a net weight of 375 lbs., or may be bought in sack of 185 lbs. In some cases a rebate of $0.60 (Mex.) is allowed for the return of the barrel and $0.15 for the return of the gunny sack.

Prices for contracts covering 5,000 bbls. are: Tongshan cement, China, $7.40 (Mex.) per bbl.; Green Island cement, Hong Kong, $7.40 (Mex.) per bbl.; Haiphong, Indo-China, $6.89 (Mex.) per bbl.; Onodo, Japan, $6.37 (Mex.) per bbl.

These are based on prices at Shanghai, for this is a central point to which Far Eastern cements are brought by water and meet there in competition on about equal terms. None of these plants carry large stocks, and on an order for 5,000 bbls. delivery would have to be spread over a period of from five to six months, so that the plants could take care of their usual small-lot orders.

A cement plant, to cost $5,000,000 (U. S. currency) is reported to be projected for the Philippine Islands, and some of this cement may eventually find its way into the Chinese market. There is also a modern cement plant owned by Chinese in operation at Singapore. None of this cement so far has entered the Chinese market in quantity, but the possibility of putting it on this market in competition with other cements is under consideration.

Lime is used all over China, some being made from local limestone, but in other cases it is transported considerable distance. In Hong Kong, which is essentially a foreign city, about 10,000 tons of lime are used annually. Inferior lime, made from shells, sells in Hong Kong for $11.76 (Mex.) per long ton, and lime made from limestone brings a price of $16 (Mex.) per ton. Prices for lime in the interior vary greatly according to the distance from the kilns and no reliable average price can be given.

CHINESE FOREIGN TRADE IN CEMENT

The following table shows the Chinese imports of cement, in barrels of 375 lbs. net, in 1918, 1919, and 1920, as taken from the Chinese Maritime Customs reports:

Countries of Origin	1918 Bbls.	1919 Bbls.	1920 Bbls.
Hong Kong	41,816	53,634	89,780
Macao	34,704	53,729	88,283
French Indo-China	3,931	38,982	114,647
Singapore, Straits Settlements, etc.	....	....	5
British India	14	4	15
Great Britain	16	387	270
Sweden	....	....	6
Italy	....	....	2,724
Austria and Hungary	....	....	9,953
Russia and Siberia by land frontier	....	2,193	....
Russian Amur ports	59	9	318
Russian Pacific ports	27,240	15,179	2,694
Korea	1,868	1,784	78,543
Japan (including Formosa)	210,121	375,463	243,266
Canada	....	....	108
United States (including Hawaii)	30	90	847

A small amount of this cement was re-exported. The total net imports, after deducting these re-exports, amounted to 306,526 bbls. in 1918, 538,599 bbls. in 1919, and 622,726 bbls. in 1920.

The exports of cement from China in 1918, 1919, and 1920 are shown in the following table:

Countries of Destination	1918 Bbls.	1919 Bbls.	1920 Bbls.
Hong Kong	22,069	15,192	37,230
Macao	....	7	34
French Indo-China	..	....	213
Dutch East Indies	115,972	7	5,337
Russian Pacific ports	....	22	....
Korea	778	....	7,947
Japan (including Formosa)	22	35	25
Philippines	39,990	45,215	10,988
	178,831	60,478	61,774

American Cement in India[1]

BY AVRA M. MURRAY
CONSUL, KARACHI, INDIA

Recent announcements made by the Government of India of assignments of additional engineers to the development of the Sutlej Irrigation Project, reports advocating the development of hydro-electric power in Northern India, together with planned building operations by Indians and Europeans in this consular district, has aroused an active interest into the possible extent that American cement may share in the construction work to be developed, contingent upon the improvement in Indian finance.

At the present time the large stocks of material accumulated in the past three years have been exhausted, and the engineering firms and importers of steel, cement, and other construction materials are indicating an increasing interest in the availability, quality and price of materials offered by the American, Japanese and German producers.

COMPETITIVE CEMENT MARKETS

The cement generally in use in India falls into three general classes according to quality. Where special European construction or Government specifications name a standard quality, high grade British cement has encountered no competition because of a sustained national prejudice in favor of its superior quality above specification. Even though high grade American cement should equal the British product in quality it would probably find the market closed on account of an accumulated opinion in favor of the home product.

INDIAN CEMENT

At the other extreme of quality is the native cement produced in India, declared by construction engineers to be an inferior variety of mud and used only in construction of a temporary character, where durability is sacrificed to cheapness in price. The native cement is used to some considerable extent for purely native enterprises in Northern India, and in spite of its cheapness and the proximity of the supply, enters in a very limited way into the general field of cement construction.

GERMAN AND JAPANESE CEMENTS

Between these two extremes of quality, the higher British standard and the lower grade Indian cements, there is a large market for cement of fair quality in which price is the governing factor.

Up to the last twelve-month period the British and Japanese competed for this market in India, although Germany because of the absence of reliability in the quality of the latter have gradually lost their position in favor of the Japanese product. It appears to be a by-word with British construction engineers that every cask of Japanese cement must be examined for stone and sand. The Germans, on the other hand, because of low manufacturing costs and low freight rates, are becoming strong competitors of the average grade British cement producers for the Indian market, and have forced the British to lower their price below that of the German product in order to hold the trade.

POTENTIAL MARKET FOR AMERICAN CEMENT

It is into this market, disputed between the British, the German and the Japanese, that it is believed American cement may be introduced if the handicap of greater ocean freight charges may be overcome. The extent of the market, the great irrigation and hydro-electric projects and the inevitable revival of building construction in India warrant a careful consideration of the problem.

In the course of discussions with the managing director of the local firm of Messrs. Oddin-Taylor and Pratt, Ltd., importers and constructing engineers, who have agents throughout Northern India in constant touch with Government and civil construction projects, feasible plans have been debated for the introduction of American cement at a price low enough to compete with British and German products. The shipment of American cement in sacks is prohibitive in cost, and the shipment of cement in casks or barrels is not only high in cost but is expensive because of breakage and leakage.

It is felt that if advantage is taken of the low cost of Indian manual labor and the low price of sacks that are manufactured cheaply from jute in the Indian mills, shipments in bulk by steamer lots of American cement can be made at a very low cost and the cement bagged at the port of entry, with no loss in quantity and at a total cost sufficiently low to undersell similar British products.

If the plan is considered worth the study of American exporters of cement it is recommended that direct communication be established with the local firm of Messrs. Oddin-Taylor and Pratt, Ltd., looking to a visit of a personal representative, where the whole field in its technical detail may be carefully considered.

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[1] From Department of Commerce Report.

Bones and Sinews of Association Work[1]

By O. B. Towne

The Trade Association idea has come to the attention of the general public, and especially the government, within the last few months in a manner which has called forth both criticism and defense. Those who have misunderstood the real meaning of the term have been loud in their denunciation of any kind of business organizations. Those who are familiar with the cooperative action of business men for their own protection have come strongly to the support of the work being done and have defended the trade group both before the judgment seat of the government and the jury box of the general public.

Certain kinds of politicians and radically inclined agitators contend that the trade association is worse than the trust, and its final effect upon the business of the country is to restrict trade, to increase prices, to limit the territory over which certain products may be sold, and to grind down the working man to the level of serfdom. Those who are so pronounced in these statements forget the fact that they are advocating similar cooperation among the people of their own group for the solution of similar problems which are common to them. They also forget that there is no separate, privileged class in the United States—not even the laboring man or the farmer—that we are all responsible alike to the laws of the country and to the fundamentals of democratic civilization.

When storm clouds have past, when winds have ceased their roaring, and mountainous billows of the sea subside into a gentle swell, the mariner takes his bearings to find out his exact location; he turns to his compass to find the direction in which he is sailing. Let us do likewise in connection with the trade association idea. Let us take our bearings and ascertain the location upon the chart of commerce. Let the laws of our country be the determining factor in establishing the legal right of the idea to exist, and let the fundamental laws of economics and economic history determine the soundness of the idea.

A wrong impression stays longest in the minds of some. The wrong impression, because of the shortcomings of a few—who would have shown the same shortcomings regardless of their calling—has stuck in the minds of many as touching organizations of business. Organizations of business have developed as the logical result of necessity. And as such they will live, meeting and eliminating those conditions and competitive methods which have proved economically destructive and intelligently impossible. The business organization, commonly called the trade association, is the logical product of intelligent effort on the part of intelligent men to seek relief from unjust, uncalled for and perverted business conditions which oppress. First, commerce and industry seek relief from oppression; second, they seek to protect what is theirs by right; third, they seek permanent development. Selfish? Sure, it is selfish. Intelligently selfish. As selfish as the Parable of the Talents. The kind of selfishness which makes one lock his door at night, open the windows to get plenty of fresh air, and then to get up in the night to see if the covers are properly tucked around the baby—his baby—and to stir up the furnace in the morning.

When human nature first recognized ethical responsibility, civilization was born. When relative desirability brought forth a sense of values, the principle of economics was discovered. Barter and trade became commerce and industry, and, with an ever-increasing crescendo of importance and power, commanded the attention and best efforts of human intelligence. Commerce and industry recognize no time, no political boundaries, no nationality, no latitude or longitude, no race or creed. They are elements of a great system of fundamentals, and embody the economics of human relationship and the gratification of humanity's ambitions and desires.

In primitive civilization, the family gathered from natural sources, or produced in its primitive way sufficient to satisfy its material desires. The only strife was for the possession of coveted areas of food supply. This strife was military in its essence and aimed at the annihilation or the enslavement of the opposition. Military might was the only competitive method known, and was immediate and final argument.

Men Seek Protection

With the growth of human thinking, men realized that they never outgrow the age-old instinct to seek protection, in one another, from the storm and stress of the times, and from events and men. When man seeks protection, anyone similarly perplexed is a friend. With him there is common cause and together the common enemy is fought and the common problem solved. A common need is to be met by common effort.

The Beginning of Cooperation

A partnership of persons, or groups of persons, had been found possible in the strife for the commonweal. In this crude beginning we find the essence of the trade association. The individually weak sought the strength of organized numbers. The individually strong, seeing possible disaster to the strong in disaster to the weak, sought self-preservation through the protection of all.

The Ground of Common Understanding

The basis on which men cooperate is in the ground of common understanding. It is in many respects like the philosophy of the common denominator. This philosophy is easily stated.

Take two numbers—24 and 36. The common denominator is 12; add another, say 42, and the denominator is at once reduced to 6. Add another, say 52, and it is reduced to 4. Add 53 and the denominator is reduced to 1.

The application is just as simply stated.

Take two manufacturers of similar training and education, and the ground of their common understanding is large. Add to the group a man in the same line of industry from another part of the country. The ground of common understanding is at once reduced. Add a man of different education, who has forced his way into the industry and has practically everything to learn. The ground is still further reduced. Add to the group men who have only one ideal, money; also, the idealist, the hard-headed man who has come up from the bottom, and the inventive genius who reaches out for the new and the untried. The ground of their common understanding has so shrunken that it is well nigh impossible even for a shrewd diplomat to reach them all at the same time and weld them into an operating entity.

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[1] A paper read at the Fourth Annual Convention of the National Lime Association, June, 1922.

Yet that is the problem, abstractly stated, which has been faced and handled since organized effort in commerce and industry was first undertaken.

Association in Medieval England

In continental Europe and in England commercial and industrial organizations are known, authentically, to have existed in the tenth century A. D. The purpose in each case was protection. In England, highway robbery and piracy on the high seas were so common and so galling to those who sought livelihood in commerce and industry, that organizations, called Merchants' Guilds, sprang up in many cities of the kingdom. They protected not only the transportation of goods, but also saved merchants, manufacturers and workmen from being kidnapped and forcibly held for ransom. During the turbulent times of the Norman Conquest, the Merchants' Guilds were so effective that their fame spread from city to city, and guilds sprung into being in all parts of the British Isles.

Conditions of the Twentieth Century

But what of to-day? Has the spirit of democracy kept its place in the ranks of commerce and industry? Haney, in his book "Business Organization and Combination," says: "In the field of human relations we are just where industry and commerce were 100 years ago—we do not trust one another." The Apostle Paul said: "Now faith is the substance of things hoped for, the evidence of things not seen." Some elements in the Apostle's definition of faith are conspicuously absent in modern commerce and industry. There is a possibility of some things being left unseen.

What Is at the Bottom of It All?

What are the basis and the principle of organization? The basis is the common problem of those associated in commerce and industry. The principle is justice.

Competition is selfish pugnacity to gain selfish and immediate benefits. While unrestricted competition sharpens the wits of those striving, the innocent public eventually bears the burden of the strife, and the greatest good to the greatest number is sacrificed to the doctrine "to the victor belong the spoils." Unrestricted competition is unnatural and falacious; but constructive, intelligent competition, together with studied cooperation, is desirable and essential to commercial welfare.

Cooperation means team work, and team work means elimination of unnecessary expense, duplication and waste. Cooperation means organization of community thinking. In commerce and industry, it means the trade organization. The purpose of industrial cooperation is to bring about a meeting of minds among manufacturers, with full facts and clear-cut principles definitely outlined, for the solution of those recognized problems which threaten the commonweal.

In modern industry the small producer is as necessary a link in the chain as is the large producer. Since the chain is no stronger than its weakest link, the weak may cause the downfall of the strong. One competitor cannot long prosper unless the other competitor may also prosper. The large manufacturer cannot be fully efficient unless the smaller manufacturer is also efficient.

The Trade Association Is Grounded on Principle

The trade association is not "a new idea." It is a fundamental principle and is the result of economic evolution. A trade association is a partnership of firms in industry or commerce. This partnership embodies the democratic doctrine of the greatest good to the greatest number. In such an organization we must find the democratic ideal in business, if we are to find it at all.

Business the Football of All Time Past

Business was the football of the nobility in ancient days. In modern days it has been the football of politics. Business for centuries was, numerically, in the minority. It was oppressed. When relief was found it sought the wrong kind of success and paid the price. Organizations of any sort have always paid, with their lives, for the perversion of sound and ethical principle to selfish interest, greed and aggression. Organizations of labor and agriculture can secure more attention than business. In a democracy, *votes count*—and the labor and farm people furnish the votes. They apparently can do things which would be wrong, legally, for business to do. Because they rebelled against this condition and made some bad mistakes, some business organizations have had a bad reputation. This reputation has been rendered worse by the conduct of unscrupulous men, by the sharpers and the thick-skinned men, significantly called the barons of industry, who think of their own selfish immediate interests as more vital than ethics and civil law.

Where Law and Ethics Agree

There is a great difference between what individuals as individuals may do and what they may agree to do together. The law says agreement among men for special efforts is conspiracy, *if* these efforts affect adversely individuals, business, or the public. Economically, also, an organization must proceed with care that there be no attempt, or intent, to impose, either directly or indirectly, the weight or power of the organized whole on the seller, or the buyer, to influence any transaction. Unfair buying is closely related to and very often is the real cause of unfair selling. However, price fixing for buying or selling is economically wrong.

The Goal of the Trade Association Is Peace

The great goal of the trade association is peace and progress in industry. Peace, which touches both the employer and the employee depends very largely upon three essentials—contentment, cooperation and activity. Industrial progress means profitably increasing the production and distribution of a constantly improving article of usefulness. To this end the trade association is teaching the business man to *think in terms of his industry and to realize that general prosperity is essential to his own success.*

The trade association must assume the tasks which are admittedly too large for any one manufacturer to handle. The trade association is only the machinery of cooperation—a means to an end; and that end is the just principle back of civilized government—government of the people, by the people, and for the people—government with the consent and cooperation of the governed. The trust is imperialism. The trade association is democracy. In democracy individuality and freedom of self-expression and initiative are still religiously retained. They are fundamental.

The trade association is the only method yet devised wherewith to inject fundamental democracy into business. The problems of industry are worked out to best advantage in the trade association, where the training and education of democracy broadens the common ground of understanding.

Individualism and Cooperation

In time of danger the savage separates himself from his fellows and fights alone, because he is a savage.

Discipline and organization are not obviously fundamental in time of peace. But in time of trouble, the two things most needed are discipline and organization. In them is safety. In time of commercial readjustment, protection for the individual is in the discipline which makes for rigid adherence to fair practice, sodes of honor, and honesty. Confidence is not an easy thing to maintain in the face of changing conditions, and turbulent business thinking. But rigid adherence to the principles of association which maintain justice to all, can steady the ship so it will ride out in the storm.

What of the legal status of the trade association? This is the question that is asked by many and is seldom answered to the satisfaction of all. Recent decisions have been rendered by the Supreme Court of the United States which have thrown a blanket of fear over the association world. Many times the question has been asked, have we a right to exist?

It is a fundamental fact that the intent determines whether an incident in question may be a crime or an accident. This applies both to private affairs and to public organization work. The trouble is with the individual man or individual firm. In the trade association the individual will always stand for the same principles in organization work that he stands for in his private life and in his private business affairs. The trade association idea may not be blamed for the low standard of honor and manhood to be found among the individual business men who make up its membership. Yet the trade association is held responsible before the jury of the general public for the conduct of the few, and the blame is placed accordingly.

The decisions which have been rendered by the Supreme Court in various cases do not affect the fundamental principle of the trade association. In the Eastern States Lumber case the decision pronounced illegal and impossible the establishment of black lists, either of customers or of those from whom we buy our raw material. This does not affect in any way, shape or form the operation of a proper credit bureau. Provision is made for the establishment of credit bureaus which will give all that honor and justice could ask. In the trade association nothing further is wanted.

In the American Hardwood Manufacturers' Association case the decision simply stated in a nut shell in the last paragraph of the opinion, that the only things condemned were "activities of the open competition plan here under discussion." In other words, that in this particular case the principles of the "open price" plan had been perverted; the intent of the individual members, as judged by their acts, being to restrain trade, unlawfully increase prices and to restrict output. That does not affect the fundamentals of trade association activity.

The Linseed Oil case, which is yet to be decided by the Supreme Court, cannot be finally interpreted here. However, one thing is established: that it is not a crime for two business men to meet together and talk business. Neither is it an indication that something criminal is intended.

The building trades and the construction associations of New York, and other places as well, have come under condemnation, not because of the operation of their associations in an open and honorable manner, but because of extortion and bribery. Nothing need be feared by any honorable association because of the decision in these cases. The statement has been made that the trade association idea favors the decision in the Child Labor case. The trade association stands for economic justice. In a nut shell, this Child Labor decision is that the Government of the United States cannot legally license, by an excise tax or any other kind of a tax, the employment of child labor. This does not set any stamp of approval on child labor. It simply says that the kind of tax called for in the child labor law is in effect a license, and as such it does not make legal or illegal the employment of children, but, on the other hand, permits the same through the payment of licenses. The law was, therefore, wrong. Child labor is a fundamental wrong against which every American that is true will spleen. It is so deep in its meaning that a statute of a State or of Congress is insufficient. It must be governed by a decree as great as an amendment of the Constitution of the United States.

The Sherman Anti-Trust Law is all right. Trade associations, properly conducted, have nothing to fear from this law. The Senator Edge Bill is not desirable, because it seeks to license trade associations and to enforce supervision of their activity, even as the courts supervise the conduct of paroled criminals.

It is an axiom in America that every man is innocent until he is proved guilty. It is also an axiom that the decision of a court convicts only in the individual case calling for that decision. It is also an axiom that a license to do business is a stamp of suspicion. The trade association idea has never been proved questionable.

Impossible to Go Wrong Doing Right

No association ever went wrong and turned from the path of rectitude because of honest effort at justice in human relations. Just as truthfully may it be said that no questionable, or unethical practice ever developed in a trade association that did not have its original and practical demonstration in the business methods of individual members. An aim of the trade association is to maintain codes of ethics and honor in business relations. Honesty is the best policy. It is also the best economy and, like truth, is a labor-saving device.

Democracy has been called ethical like-mindedness. "Scientifically, democracy is a form of government, or a form of the state, or a form of society, or a combination of all three."

Trade Association and the Government

In the light of the above definition, the trade association is the most typically democratic method, thus far devised, for operation under a democratic system of government. It supplies the logical means through which business and the government may and can cooperate. This was true, in time of war, in those countries where the association has great latitude of legalized operation, and in this country as well. This cooperation in time of war is but an earnest of what can be done in times of peace.

The Basis of Confidence

Secrecy is fatal to confidence. Secrecy is also fatal to cooperation between trade associations and the government. Open diplomacy is the only guaranty of success in the trade association. Open and square dealing between business and the government is as economically necessary as is government itself. Our government is a partner in every business enterprise which operates under the protection of the American flag and the principles for which it stands. Government, to be efficient, must know the facts of business, and *it should not be required to investigate when intelligent action in international business is urgent.* The same rule applies when commercial matters of national concern demand attention. Business, too, has a right to the full confidence and cooperation of the government for the sake of the commonweal. A democratic form of government implies, requires and promises cooperation among its component parts, on the basis of open and square dealing and full and accurate information.

CONCLUSION

Organized business effort, in the scheme of economics and sociology, is therefore a means to the betterment of those conditions under which humanity labors for life and livelihood. Its function is the elimination of injustice, fraud, misrepresentation, greed, oppression, domination, untruthfulness and dishonesty in the economics of human relations and the substitution of justice, fairness, truth, honesty and the Golden Rule in their stead. The means to this end is practical and operative business democracy.

Economics does not stop with prosaic business. It reaches into the realm of civics and bears a vital relationship to government, and to general conditions of life and living. Even as government errs when it interferes with the rights and freedom of men in their honest and just relationship, so does any organization of men err when it interferes with honest and just rights and with the progress of human efforts and ideals. The field of the trade association is the field of economic endeavor. Its applied purpose determines whether it is a compelling force for the permanent good of humanity or a stumbling block to civilization. Business is the mobilization of economic elements of production and exchange. Insofar as economics, in its practical operation, is inextricably linked with sociology, so must that mobilization of economic elements serve the permanent good of humanity.

As barter and trade reached beyond the political confines of the ancient community, so the trader became a citizen of a larger country. Today the business man is no longer a citizen only of the country in which he lives. He is a citizen of the world. He no longer depends upon the local, regional or national economic field for operation. His field is the world, and the economics of the world has a vital influence upin his prosperity and success. With this broadening of his interests, with the enlargement of his field of activity and with the growth of his power, there is a corresponding increase in his responsibility as a man.

Cooperation is an eternal law of humanity. It has swept down through history with the resistless force of the changing seasons. It has done more than any other one factor to elevate the human race from barbarism to its present state. It is as deep in its essence as eternal truth, and as broad in its operation as human intelligence. It seeks justice and honesty in human relations and enforced responsibility. It is the spirit of the Magna Charter. It is the essence of our Declaration of Independence. It is the substance of democracy. It is the fabric of civilization.

The trade association is the principle of cooperative progress in actual operation. It is a union of group purpose, group endeavor and group responsibility. It is a permanent entity in the great system of things fundamental, and is responsible to itself; responsible to government, responsible to humanity. As it serves itself it must serve humanity, *for the decree* of the Grand Architect of the Universe, *in its operation, is the Golden Rule in every phase of our thinking, and, in its purpose, "On Earth Peace, Good Will Toward Men."*

Western Rates Settled

BY IRVIN D. FOOS.

Controversy regarding western cement rates has been silenced for the time being by the Interstate Commerce Commission's order requiring carriers participating in the traffic to apply on or before October 27 an average of Scale II and Scale III rates between points in Nebraska, Kansas and Missouri in scale territory III, and rates in scale territory IV that are not in excess of 120% of rates prescribed by the Commission for scale territory III. The Commissioner's order substantially upholds the tentative report of Examiner Money in this case made public several weeks ago but the Commission's conclusions differ somewhat from those suggested by the examiner.

The Iola Cement Mills Traffic Assn. sought to have the boundary line of Scale II territory extended west and south to include that portion of Missouri in scale III territory, and those portions of Nebraska and Kansas east of a line extending generally from Sioux City, Iowa, to Arkansas City, Kansas, through Fremont and Lincoln, Nebraska, Belleville, Clay Center, White City, Wichita and Winfield, Kansas. The southern and western boundaries suggested were fixed by the petitioners so as to include generally all lines over which the rates from the Kansas gas belt mills and Dewey, Okla., to the key points of St. Louis, Kansas City, Omaha, and Sioux City and other points in scale II territory are lower than to intermediate points in Missouri, Kansas and Nebraska taking scale III rates.

The principal grounds upon which the petitioners relied are that the density of population, operating conditions, and density of traffic.in the addition to scale II territory which they proposed justified a basis of rates therein not higher than that applying in Missouri, Iowa, Minnesota and Wisconsin in original scale II territory. The Kansas gas belt mills also contended that the change proposed would practically have restored in this territory the relationship formerly existing between competing mills.

The Atchison, Topeka and Santa Fe and the Chicago, Burlington and Quincy Railroads assumed the burden of the defense and strongly opposed the extension of scale II territory into Kansas and Nebraska. They urged that the general basis of rates south and west of the Missouri river is higher than north and east thereof. They were apprehensive that the establishment of rates west of the Missouri river on the same basis as on the east would result in attack upon the entire rate structure in Trans-Missouri territory, with possible disastrous results to carriers' revenues. The witness for the Santa Fe recognized, however, that some modification should be made in the rates from the gas belt to points in Nebraska in Scale III territory, to which points the rates from Kansas City, St. Louis, Hannibal, and the Iowa and Illinois cement mills are on an average of scale II and III. The Commission approved his suggestion that the difficulties under which the gas belt mills are laboring in marketing their cement in scale territory III in Nebraska could be overcome by the application of rates based on an average of scales II and III.

The record is persuasive that scale II territory could not be extended into Kansas and Nebraska without including all of scale III territory, south of the Platte river, including Hastings and Grand Island, Nebr., the Commission reported. This would result in substantial reductions in the rates from not only the mills in the gas belt at Kansas City and Superior, but also from mills at St. Louis, Hannibal and in Illinois and Iowa, which are not asking any reductions in rates to eastern Kansas and Nebraska. The Commission also expressed its conclusion that to apply scale II territory rates in scale III territory would necessitate such a substantial downward revision of the present rates in scale IV territory, applying from all mills including those in Colorado, that it would quite likely necessitate a revision of the rates from Mason City, Iowa, and Steelton, Minn., to points in scale III and scale IV territories in Minnesota and North Dakota.

Men and Mills

Notes from the Field

The Dexter Portland Cement Co., Nazareth, Pa., is increasing its output by the addition of two 7 ft. x 100 ft. Traylor rotary kilns.

In order to dry sufficient rock to supply these two additional kilns, the hand-fired rock-dryers have been converted for pulverized coal firing, one Fuller-Lehigh pulverised coal feeder and burner being supplied each dryer.

The fuel requirements for the new kilns will be supplied by adding one 46 in. gear driven, Fuller-Lehigh, screen type, pulverizer to the present coal pulverizing plant.

The National Portland Cement Co. has excavation work under way for the initial buildings at its new plant at Coldwater Lake, and will commence foundations and superstructure at an early date, according to local reports. The main mill will be two-story, and will be supplemented with a number of other buildings, including power plant, etc. The entire plant will cost about $500,000, including machinery. A. E. Gorham, 119 South Normal St., Mount Pleasant, is president.

On July 13th a terrible fire raged in the Brixment plant of the Louisville Cement Co., and destroyed the engine room, the entire Brixment mill, the natural cement storage house, and the runways connecting the mill and the Brixment storage house and packing house. Crowds from the whole country side gathered to watch the flames, and smoke from the burning oil tanks could be clearly seen as far off as Louisville. Prompt assistance from the fire departments of Sellersburg, Jeffersonville and New Albany was all that kept the fire from spreading further.

The plant is being rebuilt as rapidly as possible, according to the *Speedometer.*

The Olympic Portland Cement Co., of Bellingham, Wash., reports that its shipments for June were the heaviest of any previous month in its history. They totaled 70,000 bbls. July's business was also large, and August was a good month. The company is operating at full blast.

The deal for the sale of the Ironton Railroad, which conveys much of the cement out of the Lehigh cement belt, has been postponed for the present. The Philadelphia & Reading Co. wishes to acquire the road and a number of properties in the cement regions.

The month of July was a big one in the demand and supply of cement out of the Lehigh regions. The state highway department placed a large order in this section, keeping many of the mills active.

Edward Shimer, son of former Mayor Edward S. Shimer, of Allentown, and one of the Lehigh Portland Cement Co. officials, and Mrs. Forsythe Gregg, Pittsburgh, were recently married in Allentown.

The Choctaw Portland Cement Co.'s plant at Hartshorne, Okla., has been closed down for many months, and at this time there is no prospect for reopening.

Return of aliens from the Lehigh cement region to their former homes in Europe has ceased almost entirely with the revival of busy times in the industry. Also, the inflow of immigrants is beginning, about forty having reached the region within the past month.

The Security Cement & Lime Co., Hagerstown, Md., is modernizing its plant by installing three 42 in. Fuller-Lehigh pulverizer mills, screen type, in their coal grinding department and installing eight 42 in. Fuller-Lehigh pulverizer mills, screen type, in their raw grinding department.

At a recent meeting of the safety engineers of Pennsylvania in Harrisburg a permanent organization was formed. George T. Fonda, the noted safety and employment chief of the Bethlehem Steel Co., was elected state president. Edward C. Spring, safety chief of the Lehigh Valley Transit Co., and Major Henry A. Renninger, safety chief of the Lehigh Portland Cement Co., were elected members of the board of directors. The selection of these three gentlemen is a handsome recognition of the Lehigh Safety Council, for whose welfare and advancement they have worked hard for years.

Freight movement in and out of the Lehigh cement region, most of which passes through the Catasauqua yards, was extremely heavy early in July, despite the fact that freight reductions were soon to become effective. The cement mills shipped at an unprecedented rate and received coal in large quantities.

Coal shipments to the mills of the Lehigh cement region were greatly decreased during the latter part of July. According to one of the cement mill officials, bituminous coal was to be had but the operators were asking very high prices for it—higher than the cement companies can afford to pay.

A celebration was given by the Superior Portland Cement Co. on August 11 in honor of the fourteenth anniversary of the first shipment of cement from the Concrete plant, and all the people of Concrete and vicinity were asked to take part and to enjoy the various events provided. The big plant was closed down for the day in order to give all the employees a chance to take in the celebration from start to finish.

Lewis Thomas, an employee of the Lehigh Portland Cement Co., at Ormrod plant, was given a dinner by a number of his fellow-workers as a farewell before his departure for his home in Wales, where he will spend two months with his sister. He was employed as master mechanic at the plant and will take up his duties again on his return.

The employees of the Lehigh Portland Cement Co. held their fifteenth annual clam bake and outing July 25 at Neff's Park, at which were gathered about 300 from the Allentown offices and the plants in the vicinity. Officials of the company were present and the plant superintendents. Music was furnished by the Lehigh Portland Band, which hails from Ormrod and is composed of the company's employees.

Much cement was being shipped by the Atlas Cement Co. Northampton, in July, and it was reported the No. 2 plant would resume operations immediately after the coal strike was settled.

Construction work on the new plant of the Signal Mountain Portland Cement Co., while seriously handicapped as a result of the shopmens' strike and the non-delivery of needed materials, is progressing rapidly. The most serious handicap is from the inability of the Belt railroad to switch cars of sand to the traction company's lines for transportation to the plant site. In spite of this fact, however, work is being carried on and sand delivered by trucks. The columns for the first unit of the $5,000,000 plant are nearly complete. Rails for the sidetracks into the property are being laid, several thousand ties already having been put in place. The stone crusher recently constructed on the property is in daily operation, and the quarry is well developed.

The first unit of the plant, when complete, will be 650 ft. long, 80 ft. wide and 55 ft. high. The construction will be of reinforced concrete. The building will be used largely for storage purposes. Storage specifications for this building are as follows: Raw rock, 15,000 tons; clay, 5,000 tons; coal, 5,000 tons; clinker, 150,000 tons; and gypsum, 2,500 tons. The building will be equipped with a two and one-half yard traveling crane bucket. This crane will serve the entire storage unit and will be one of the largest of its kind in the world. The company has completed the sawing of all lumber needed for the construction and closed the mill opened several months ago.

The company is employing a force of nearly 100 men on the job, with a payroll of approximately $2,500 per week. Twenty-five teams and trucks are in constant use. It is estimated that if construction continues at the present rate during the fall, that the actual manufacture of cement will begin about January 1, 1923. The new road, covering a stretch of nearly a mile, the company is building to replace the present county highway, is 70% complete and will be in use by September 1, it is believed. The filling is being allowed to settle at the present time before the top surface is applied.

That European manufacturers of portland cement may become serious competitors to the American and Canadian makers in the American market if the rail and coal strikes are not settled soon, is the opinion held by L. C. Newlands, vice-president and general manager of the Oregon Portland Cement Co., who recently made a six weeks' trip through the east. Mr. Newlands, who attended the meeting of the Portland Cement Association in Atlantic City, is quoted as follows in the Portland, Ore., *Journal*.

"At the convention one of the association representatives made a report of an extended survey of the industry in England, Belgium, France and Germany," Newlands continued. "The report stated that up-to-date methods, that in some cases were superior to the American methods, were being used abroad in the manufacture of cement.

"Lower wage costs were found to exist in all four countries. In Germany it was found that the average wage paid operators in the cement plants was only 9 cents an hour. Germany, however, restricts the sale of its cement to nations allied to it. For that reason she will not be a serious competitor.

Competition Serious

"Importation of European cement to this country will be a serious blow to the American manufacturers. American makers have had lean years since the outbreak of the World War in 1914, and with the losses they stand to have, due to the strikes, such competition may raise havoc with the American and Canadian production."

A rather expensive accident happened at the Quincy plant of the Wolverine Portland Cement Co., on July 30, when the 14-ft. flywheel on one of the 500 h. p. engines burst. The flywheel weighed in the neighborhood of 14 tons, and two sections, each weighing about a ton, were hurled through the roof of the engine room. One went over the buildings, dropping just east of the switch track at the east end of the factory. Another section was hurled west of the factory, dropping in the driveway, and was about the same size as the other section. Smaller parts of the engine, spokes of the flywheel, etc., were scattered about the engine room.

Fortunately, no one was injured when the big wheel let go. The accident was due to the engine "running away" when a clutch was released, according to a local report.

In addition to the damage to the building, the engine, etc., the 6-in. line shaft, which was connected to this engine by a rope belt, was badly twisted and placed out of commission.

More than 350 persons attended the annual outing given by the Vulcanite Cement Co. to the contractors and dealers with whom the company deals, at Pautohpeck, on the New Jersey coast. The affair was under the direction of Albert Moyer, sales manager of the company, of New York City. About fifteen men from Phillipsburg, Easton, Belvidere, and vicinity made the trip.

The death in the massacre of non-union men at the coal mine near Herrin, Ill., of Raymond C. C. Jacobs, who was employed at the Coplay cement plant during the past winter and who had made many friends, has caused much sorrow in Coplay. Jacobs left Coplay when labor readjustments were made at the local plant. According to his friends, he did not know he was going to a non-union mine, but believed he was to work in Chicago.

George P. Dieckmann, formerly vice-president of the Gulf States Portland Cement Co., Demopolis, Ala., has severed his connection with that company.

The South Dakota State Cement Commission, Rapid City, S. D., contemplated holding a meeting in August at which time some definite action was hoped for relative to the construction of the proposed state cement plant at Rapid City.

J. Thompson Brown has been appointed general manager of the Explosives Department of E. I. du Pont de Nemours & Co. to succeed the late Charles A. Patterson.

Mr. Brown was first employed by the du Pont company in 1903 and has been engaged in plant engineering and special and general operating work at the high explosives plants.

Trade Publications

Sandvik Steel Belt Conveyors, Catalog No. 18-T, by Sandvik Steel Ind., Conveyor Dept., 2001 Woolworth Bldg., New York. Size 6 in. by 9 in., 24 pages, paper cover. This catalog is illustrated and describes Sandvik steel belt conveyors, giving details of the various types of installation where steel belt conveyors are used.

Jones Gears, by W. A. Jones Foundry and Machine Co., Chicago, Ill., Catalog No. 24. This catalog is 5 in. by 7½ in., has 108 pages, is neatly bound and illustrated. Useful information is tabulated regarding gears of every description, including spur gears, bevel gears, mitre gears, worm gears, circular pitch gears, and speed reducers.

It also contains list prices for rawhide pinions, as well as miscellaneous information useful when laying out gear drives or for estimating purposes. Net prices for all sorts of cut or cast gears will be quoted on application.

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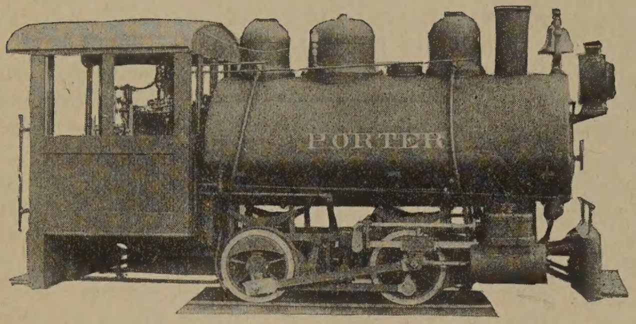

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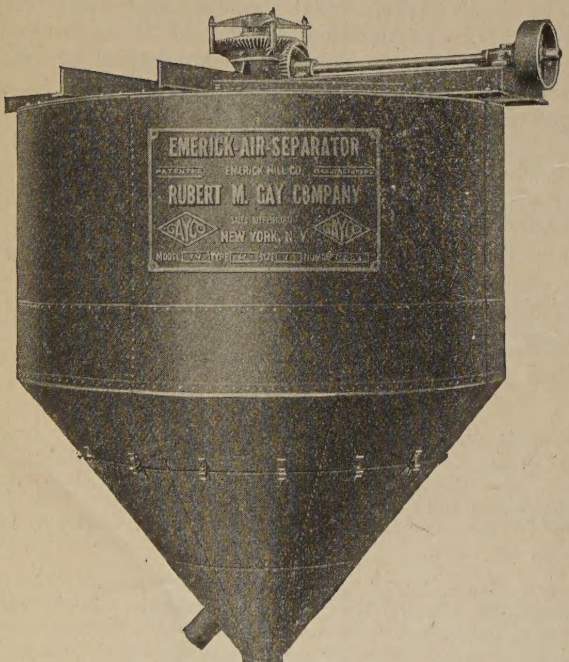

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